

CFsys[™] FDM Printing Material

Technical Data Sheet

CFsys[™] CIRON[®]

长链尼龙12基15%短切碳纤维增强3D打印材料。

15% Carbon Fiber Reinforced PA12.

产品介绍 Product Description

CFSYS[™]CIRON[®]专为FDM3D打印工艺开发，基材选用PA12长链尼，具有低密度，低吸湿，高强度，高耐磨性，耐化学性优异和高耐热性的特点。打印过程中尺寸稳定性好，无翘边无收缩现象，并且可以与CFSYS[™]S-PET易剥离支撑材料配合使用，解决复杂模型支撑面成型效果差的难题。

CFSYS[™]CIRON[®] is specifically developed for FDM 3D printing processes. It utilizes long-chain PA12 as the base material, offering low density, low moisture absorption, high strength, excellent wear resistance, outstanding chemical resistance, and high heat resistance. During printing, it demonstrates excellent dimensional stability with no warping or shrinkage. Moreover, it can be used in combination with CFSYS[™]S-PET easy-release support material to solve the challenge of poor molding quality on support surfaces of complex models.

产品亮点 Product Advantages

- **低湿度敏感性**

CFsys™CIRON®基材使用PA12长链尼龙, 饱和吸湿率仅为普通PA6的十分之一, 彻底解决尼龙材料吸湿前后机械性能与尺寸稳定性变化极大的缺陷。

- **Low Moisture Sensitivity**

CFsys™CIRON® is formulated with long-chain PA12 nylon as its base material, with a saturated moisture absorption rate only one-tenth that of conventional PA6. This fundamentally addresses the issue of significant fluctuations in mechanical properties and dimensional stability of nylon materials before and after moisture absorption.

- **低密度**

CFsys™CIRON®是密度最低的FDM工业级打印材料之一, 轻松实现高强度轻量化需求工业应用。

- **Low Density**

CFsys™CIRON® is one of the lowest-density industrial-grade FDM printing materials, easily meeting the demands of high-strength, lightweight industrial applications.

- **耐摩擦**

CFsys™CIRON®摩擦系数低, 具有自润滑性, 耐磨性极佳。轻松实现各类高强度齿轮或高耐磨要求工业应用。

- **Wear Resistance**

CFsys™CIRON® features a low coefficient of friction and self-lubricating properties, delivering outstanding wear resistance. It is well-suited for various high-strength gears and other industrial applications requiring exceptional durability.

产品详情 Available

颜色 Color: 黑色 Black

线径 Diameter: 1.75mm

净重 Net Wet: 1kg

物性表 Material Properties

测试项目 Property	测试方法 Test Method	典型值 Typical value
密度 Density	ISO 1183	1.09 g/cm ³
吸湿率 Moisture Absorption Rate	ISO62: Method 1	0.6°C
熔点 Melting Point	ISO 11357	167°C
熔融指数 Melt Flow Index	260°C, 2.16kg	11
热变形温度 Determination of temperature	ISO 75: Method A ISO 75: Method B	102°C (1.8MPa) 124.6°C (0.45MPa)
拉伸强度 Tensile strength (X-Y)	ISO 527	65.53±0.98 MPa
拉伸模量 Young's Modulus (X-Y)		3317.69±55.41 MPa
断裂伸长率 Elongation at break (X-Y)		3.33±0.17%
弯曲强度 Bending strength (X-Y)	ISO 178	103.13±1.46 MPa
弯曲模量 Bending Modulus (X-Y)		3340.15±259.26 MPa
缺口冲击强度 Charpy impact strength (X-Y)	ISO 179	9.58±0.7 KJ/m ²
拉伸强度 Tensile strength (Z)	ISO 527	38.76±1.05 MPa
拉伸模量 Young's Modulus (Z)		1694.0±77.48 MPa
断裂伸长率 Elongation at break (Z)		4.25±0.45%

试样打印参数:喷嘴大小0.4mm, 喷嘴温度300°C, 底板加热60°C, 打印速度45mm/s, 填充率100%, 填充角度±45°

后处理条件:100°C退火8小时

Specimen Printing Parameters: Nozzle diameter 0.4 mm, nozzle temperature 300°C, heated bed temperature 60°C, printing speed 45 mm/s, infill density 100%, and infill angle ±45°.

Post-processing Conditions: Annealing at 100°C for 8 hours.

建议打印参数 Recommended printing conditions

喷头温度 Nozzle Temperature	280-300°C
建议喷嘴大小 Recommended Nozzle Diameter	0.4-1.0 mm
建议底板材质 Recommended build surface treatment	涂抹PVP固体胶 Applying PVP solid adhesive
底板温度 Build plate temperature	40-70°C
Raft间距 Raft separation distance	0.08-0.12 mm
冷却风扇 Cooling fan speed	Off
打印速度 Print speed	30-120 mm/s
回抽距离 Retraction distance	1-3 mm
回抽速度 Retraction speed	1800-3600 mm/min
建议支撑材料 Recommended Support Material	CFSYS™ S-Multi Quick-Remove Support

其他建议:

1. 尼龙材料非常容易吸收环境内的水分，吸湿后打印会出现拉丝，挤出有气泡，打印表面粗糙等现象，降低打印质量。建议您打开CFsys™CIRON®真空铝箔袋包装后立即将线材放入干燥盒内(湿度控制在15%以下)进行打印。不用的线材请放回原包装铝箔袋内密封保存。
2. 材料受潮后会出现打印拉丝增多，挤出有气泡，打印表面质量粗糙等现象。请将线材放80-100C烘箱内干燥4-6h,即可恢复CFsys™CIRON®的打印质量。
3. 建议选用硬化钢及以上等级喷嘴，可以有效提高打印质量，建议加热块厚度不小12mm。
4. 打印完成后可以对打印件进行退火处理，可以进一步提高CFsys™CIRON®打印件的强度,退火条件:80-100C温度下放置4-8小时后自然冷却到室温。

Additional Suggestions:

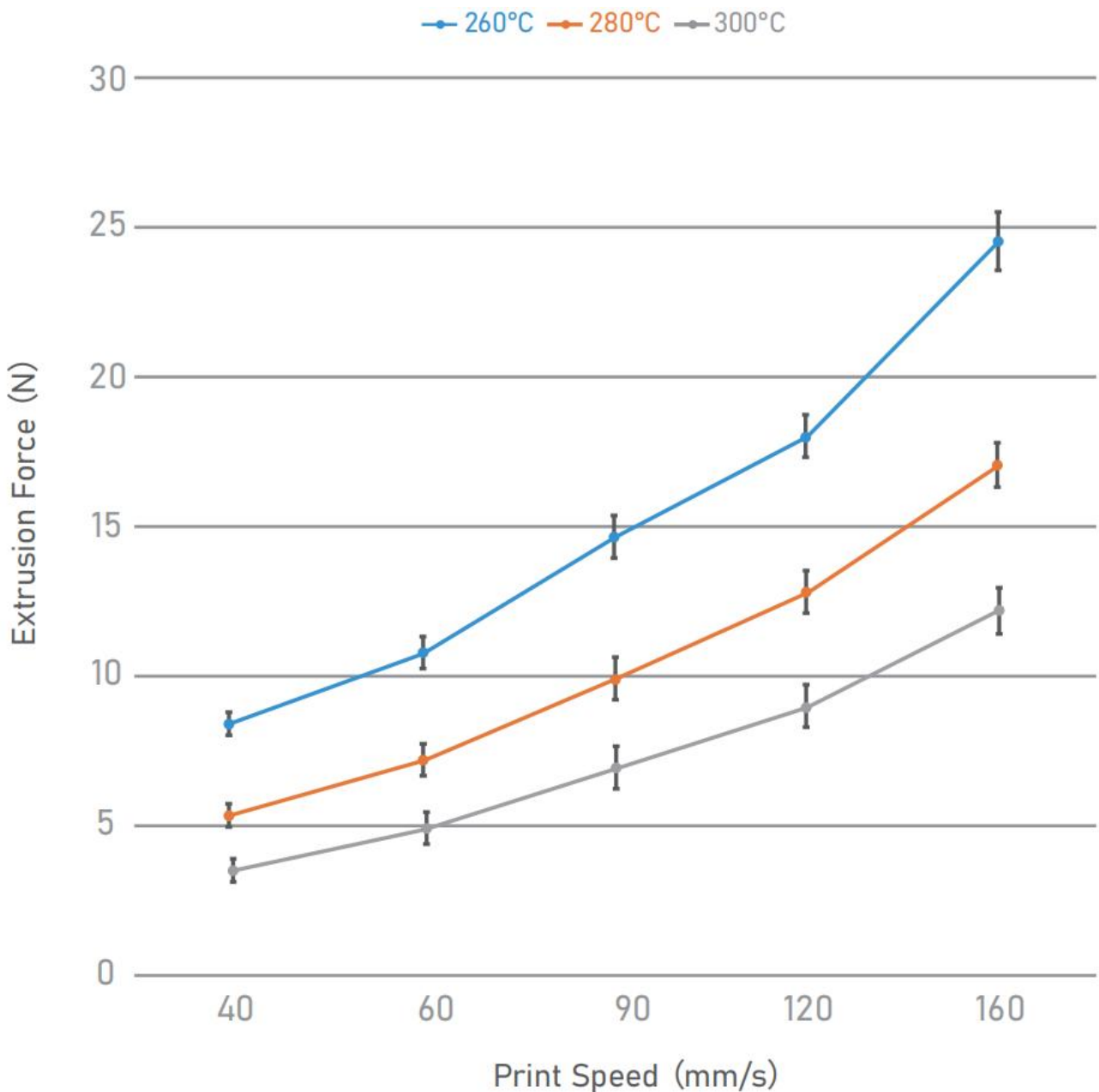
1. Nylon filament is highly hygroscopic and can easily absorb moisture from the environment, leading to issues such as stringing, bubbling during extrusion, and rough surface finishes, which compromise print quality. Therefore, after opening the vacuum-sealed aluminum foil packaging of CFsys™CIRON®, it is recommended to promptly place the filament in a dry box (with humidity maintained below 15%) for printing. Unused filament should be resealed and stored in its original aluminum foil bag.
2. If the filament becomes damp, print quality issues like increased stringing, extrusion bubbles, and poor surface texture may occur. To restore optimal printing performance with CFsys™CIRON®, dry the filament in an oven at 80–100°C for 4–6 hours.
3. For improved print quality, it is advised to use a hardened steel nozzle or higher-grade nozzles, with a heater block thickness of at least 12 mm.
4. To enhance the strength of printed parts made from CFsys™CIRON®, annealing is recommended after printing. Anneal the parts at 80–100°C for 4–8 hours, then allow them to cool naturally to room temperature.

挤出压力与打印流量速度测试

Extrusion Force vs Print Volumetric Speed Test

CFsys[™] CIRON[®]

15% Carbon Fiber Reinforced PA12



测试参数: 12mm厚度铜制加热块, BMG挤出机, 中纤硬化钢喷头, 喷嘴大小0.4mm, 层高0.2mm。

Test parameters: 12mm length brass heat block, BMG extruder, CFSYS Hardened Steel Nozzle, Nozzle size 0.4mm, Layer Height 0.2mm.